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marked up version of specification

TRANSLATION

STEAM MISTING FOR SPINNING SYSTEMS WITH RECTANGULAR NOZZLES

SPECIFICATION

CROSS REFERENCE TO RELATED APPLICATIONS

This application is a national stage of PCT/EP00/03390 filed 14 April 2000 and based upon German national application 199 20 682.1 filed 5 May 1999 under the International Convention.

FIELD OF THE INVENTION

The invention relates to the steam misting in the production of polyamide filaments, especially for rectangular spinning nozzles in accordance with the bottom loading concept and a spinning system equipped therewith.

In the spinning of polyamides, especially for polyamide 6 (nylon 6), during the discharge of the filaments from the spinning nozzles, monomers and oligomers in the form of unpleasant smoke clouds are produced which can be released in an uncontrolled manner into the surroundings. In order to prevent this, these emissions can be evacuated via suction nozzles which must be provided as close as possible to the spinneret outlets. The functions and the shapes of such suction nozzles have been made known in DE 198 36 682.5. From DE 198 30 453.6 it is known, further, that superheated steam which serves to moisten the polyamide filaments and to support the suction effect, can simultaneously increase the wiping interval time for the spinning nozzle when blown directly thereagainst.

Conventional devices which serve for the aforedescribed purposes are damaged however during the cleaning or replacement of the nozzles. Thus it has been, for example, proposed at one time

to provide the conventional nozzle misting so that the steam is blown onto the longitudinal side of a rectangular nozzle stack centrally against the side wall of the relevant nozzle stack so that it then flows in the gap between the nozzle stack and the nozzle shaft in the spinning beam downwardly and is rerouted by a baffle plate more or less uniformly in the direction of the spinning plate. This device is, apart from the insufficiency of the moisturization produced, not usable for rectangular nozzle stacks in accordance with the bottom loading concept, even to a lesser extent than is the solution for round spinning nozzles from the application DE 198 30 453.6 which differs based upon the after-heater which is directly following and also based upon concept.

OBJECT OF THE INVENTION

Thus it is the object to provide a reliable apparatus, which is service-friendly and is easy to clean, for the steam moisturization of rectangular nozzles and the solution according to the invention has the features of the claim 1.

SUMMARY OF THE INVENTION

The advantage of the new steam misting resides in the good temperature control of the steam, whereby the steam feed is effected through a tube loop which passes through the heating chamber of the spinning beam so as to bring the steam up to the spinning temperature. Advantageously, the steam outlet bars are directly below the spinning beam and thus on the lower edges of the rectangular nozzle stack connected therewith, between the spinning beam and the after-heater. These steam outlet bars are equipped with a simple labyrinth for pressure equalization which can be fabricated especially inexpensively. The steam inlet is effected

initially respectively centrally to the rectangular nozzle stack and into an upwardly open and relatively broad distribution chamber along the rectangular nozzle stack.

This vertical distribution chamber transitions into a horizontal and very narrow gap space which opens into the spinning chamber. Into the latter, the steam is spread out and uniformly flows in the direction of the nozzles. This results so effectively that a misting from the ends inwardly is superfluous. A more detailed description of the method and the apparatus for steam misting of rectangular nozzles and the spinning system equipped therewith for producing polyamide filaments is provided below in conjunction with drawings. Thus in the drawings

FIG. 1 shows a section through a spinning beam into which the steam misting of the invention is built;

FIG. 2 shows a detail section of the steam misting in its assembled state; and

FIG. 3 shows a detail section of the steam misting in the disassembled state.

FIG. 1 shows an exemplary spinning system. The section is through a spinning beam 1 with rectangular nozzles 2, its insulation 3 and the after-heater 4 as well as the monomer suction 5. Below it one can see the blowing device 6 and here also is represented the filament curtain 7 in the spinning chamber 8 of the after-heater 4. The steam feed is effected via a pipe loop 9 which extends through the heating chamber 10 of the spinning beam 1 so that already superheated steam is brought further to the spinning

temperature. Directly below the spinning beam 1 and thus on the lower edge of the rectangular nozzle stack 2 which is connected thereto, between the spinning beam 1 and the after-heater 4, on a longitudinal side - and with very wide spinning stacks on both sides - steam outlet bars 11 are provided which are each comprised of a base bar 12 and a distributor bar 13 forming together with the lower edge of the spinning beam 1 a labyrinth distribution chamber 14 which is described in greater detail below. The ends of the rectangular nozzle stack 2 do not need to be sprayed with steam however in any case.

In FIG. 2, the steam outlet bar 11 for the steam misting has been shown in a detail section in its assembled state, i.e. ready for operation and fixed between the spinning beam 1 and the after-heater 4. These steam outlet bars 11 are equipped with a simple labyrinth distribution chamber 14, for pressure equalization. This labyrinth-like distribution chamber 14 is laterally bounded by the base bar 12 and from above by the lower edge of the spinning beam 1 and itself can be formed mainly from cutouts 15, 16 in the distributor bar, forming a vertical distribution chamber 15 and a horizontal gap 16. From the pipe loop 9 the steam is introduced at 19 initially respectively centrally through the base bar 12, i.e. also centrally with respect to the rectangular nozzle stack 2 and opens into the upwardly open and relatively broad distribution chamber 15 longitudinally into the distribution bar 13. This vertical passage 15 transitions on into a horizontal, very small gap 16 which opens into the spinning

chamber 8. From this passage 16 the steam then flows in the direction of the nozzles transversely to the filament curtain 7.

FIG. 3 shows a steam outlet bar 11 in its disassembled state. On the base part 12 one can see the steam inlet 19 and the end of the tube loop 9 opening into it as well as the two fastening screw threads 17 for the distributor bar 13. On the distributor bar 13 one can recognize the screw hole 18 and the openly accessible cutouts 15, 16 for cleaning, namely, the vertical distribution chamber 15 and the narrower horizontal gap 16 which form the steam distribution labyrinth 14 once the device is completely assembled as has already been described.

The steam misting system is primarily conceived for use in apparatus for the spinning of high-strength polyamide yarns, but it can however be used universally wherever a spinning outlet surface is to be misted with steam or a moist spinning atmosphere is to be obtained. The use is therefore not limited only to bottom-loading spinning systems.

(A)

Reference Character List

Spinning beam [spinneret] (1)

Rectangular nozzles (2)

Insulation(3)

After-heater (4)

Monomer suction device (5)

Blowing device (6)

Filament curtain (7)

Spinning chamber 8 of the after-heater (4)

Tube loop (9)

Heating chamber (10) of the spinning beam (1)

Steam outlet bar (11)

Base bar (12); also base part

Distributor bar (13); also distributor part

Distributor chamber (14), labyrinth-like; also steam distribution labyrinth

Distributor chamber 15, vertical; also first passage; also cutout

Gap (16), horizontal; also second passage; also cutouts

Fastening thread (17)

Screw hole (18)

Steam inlet (19), central

Patent Claims

We claim:

1. A method and apparatus for the steam misting of rectangular nozzles and spinning systems equipped therewith for producing polyamide filaments, especially in accordance with the bottom-loading concept, characterized in that the steam required for the steam misting initially flows through a tube loop lying in the carrier steam of the spinning beam in order to heat it approximately to the same temperature as the spinning temperature, itself, the steam being then passed through a pressure equalizing distribution chamber (14) before it then directly emerges on the entire longitudinal side of a rectangular nozzle stack, (12) and finally is directed in a uniformly distributed manner in the spinning chamber (8) to the spinning plate.

2. The method and apparatus according to claim 1 characterized in that the pressure equalizing distribution chamber (14) is arranged respectively along a single longitudinal side of each rectangular nozzle stack and is configured in a labyrinth shape and is fed only by a single steam inlet (19) from the tube loop (9) centrally.

3. The method and apparatus according to claims 1 and 2 characterized in that the pressure equalizing and labyrinth-like

distribution chambers are respectively provided on both longitudinal sides of the rectangular nozzle stack.

4. The method and apparatus according to one of the preceding claims characterized in that the pressure equalizing and labyrinth-like distribution chambers which have single centrally oriented steam inlets (14) in their simplest form each are comprised of at least two passages (15, 16) with rectangular cross sections, which are open on their longitudinal sides and transition between one another at right angles, whereby the first passages (15) has two to a maximum of five times greater rectangular cross sections than the subsequent second passages (16).

5. The method and apparatus according to one of the preceding claims characterized in that the pressure equalizing and labyrinth-like distribution chamber (14) which has a single central and horizontally oriented steam inlet (19) have in their simplest form each at least two passages (15, 16) with rectangular cross sections which are open at their longitudinal sides and transition between them at right angles, whereby the first and larger passage (15) has an upwardly open rectangular cross section which runs into the right angled horizontal and very small gap of the subsequent second passages (16) which then opens with one of its longitudinal sides into the spinning chamber and through which the steam is uniformly distributed transversely to the filament curtain in the direction of the nozzle.

6. An apparatus for the steam misting of rectangular nozzles and spinning systems equipped therewith characterized in that the pressure equalized and labyrinth-like distribution chambers (14) each of which has a single steam inlet, has a steam outlet bar (11) which in its simplest form is comprised of at least two bars attached together by screws (12, 13) whereby the respective base part (12) with the central steam inlet (19) is fixed between the spinning beam (1) and the after-heater (4), and that the distributor part (13) is also so connected by screws to the base part (12) that it can be removed for cleaning.

7. The apparatus according to one of the preceding claims characterized in that the pressure equalizing and labyrinth-shaped distribution chamber (14) which follows a single steam inlet (19) is configured as a simple steam equalizing labyrinth (14) which is formed first by the fixed and smooth walls of the base bar (12), second by the fixed and smooth underside of the spinning beam (1), and third and fourth by the cutouts (15, 16) in the ~~mounted~~ distributor bar (13).

Abstract

A method and apparatus for the steam misting of rectangular nozzles and spinning systems equipped therewith for producing polyamide filaments whereby the steam feed is conducted through a tube loop which is passed through the heating chamber of the spinning beam so that the steam is brought to the spinning temperature. Directly below the spinning beam and thus on the lower edge of the rectangular nozzle stack which is connected thereto, between the spinning beam and the after-heater, steam outlet bars are longitudinally applied. These steam outlet bars are equipped with a simple labyrinth for pressure equalization. The steam inlet is effected initially in each case centrally of the rectangular nozzle stack and transitions into an upwardly open and relatively broad distribution chamber along the rectangular nozzle stack. This vertical distribution chamber transitions into a horizontal and very small gap which is open into the spinning chamber at its mouth. The steam then travels in the direction of the nozzles transversely to the filament curtain. The ends of the rectangular nozzle stack need not be misted with steam.